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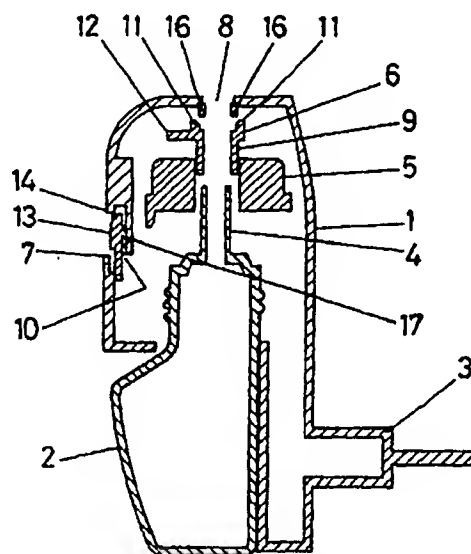
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(54) EVAPORATED DEVICE FOR THE EVAPORATION OF VOLATILE PRODUCTS WITH VARIABLE EVAPORATION INTENSITY BY INTERPOSITION OF A MOBILE BUSHING

(57) A device is disclosed meant to perform evaporation of insecticides, perfumes or the like, wherein the degree of evaporation is controlled by a moving cap (9) which makes up the regulating element (6), which is meant to produce a chimney effect in the upwards motion of the generated vapor, so that this effect enhances evaporation, while regulation is achieved by the different heights at which moving cap (9) can be placed. This displacement is performed manually by moving guide (13) inside inclined track (10).



**FIG.1**

## Description

### OBJECT OF THE INVENTION

[0001] The present invention relates to a device designed to evaporate volatile products for air fresheners, insecticides or similar substances, by heat provided by electrical resistors, in order to enhance the evaporation of the product which soaks a wick from the product container.

[0002] The invention centers on the means which the device incorporates in order to allow an adjustable intensity of evaporation.

### BACKGROUND OF THE INVENTION

[0003] Volatile substance evaporators are widely known in the market, generally applied to insecticides or perfumes, and having a vessel containing the product to be evaporated, which rises by capillarity through a wick which leads the product near heating resistors which by their heat cause the evaporation.

[0004] In order to adapt use of these devices to different utilization conditions or consumer preferences, the rate of evaporation of the substances may be controlled, thus releasing a larger or smaller amount of evaporated product to the surroundings.

[0005] In this sense Patent application no. 9701388 is known, in which one of these devices is disclosed where the rate of evaporation is controlled by changing the relative position of the wick and the heating element.

[0006] In this device, the electrical heating resistors are static, and it is the container and the wick which move axially by means of a threading in order to change the degree of exposure of the wick in the area of influence of the heating resistors.

[0007] These devices seek to combine simplicity and economy of production with efficiency and ease of use, as well as to make this use attractive to the consumer.

### DESCRIPTION OF THE INVENTION

[0008] The invention here disclosed has been designed to provide an evaporator for volatile products with adjustable evaporation rate, in which the means which make the evaporation possible imply greater simplicity of construction and an easier and more pleasant operation of the device.

[0009] The adjustment of the rate of evaporation is achieved by a moving cap, which in addition to providing the evaporator with the aforementioned characteristics, allows a more efficient regulation of the evaporation of the volatile product than in previously known systems.

[0010] In this way the volatile product evaporator is made from the basic structure for these devices, with a case or body which houses the heating resistors and externally forming a plug for connection to the electrical

mains, for power supply to the heating resistances. As a rule these resistors are of the PTC type.

[0011] The lower end of the case is provided with means of coupling the vessel containing the volatile product, either by screwing on or by any other conventional technique, so that it may be replaced by a new vessel when the content is exhausted.

[0012] Inside the vessel is a cylindrical wick which absorbs the liquid by porosity so that it rises up through it until it is near the heating resistors.

[0013] Based on this known arrangement of these devices, the invention is centered in that in order to determine the rate of evaporation, the evaporator is provided with a cap which can be manually axially moved, inside which is housed the wick soaked with the volatile product.

[0014] The function of the cap is to create a chimney effect which affects the rise of the vapor generated in the wick, so that this chimney effect increases the rising speed of this vapor, thereby increasing the rate of evaporation.

[0015] The axial displacement of this cap determines different heights for it, partially completing the path of the vapor to the outlet orifice. The longer this path the greater the chimney effect in the evaporation and vice versa, with a maximum and minimum position being defined by limiting the cap displacement with stops placed inside the case in a suitable manner.

[0016] The cap is connected to an arm which ends in a guide, meant to project out from the case through an inclined groove which defines the displacement of this guide. The user will operate this guide manually, which has a shape adapted to the inclined groove so that it may slide in it in either direction, upwards or downwards, thereby axially displacing the cap and adjusting the rate of evaporation.

### DESCRIPTION OF THE DRAWINGS

[0017] Further advantages and characteristics of this invention will become apparent from the accompanying drawings, attached to the present descriptive memory as an integral part and where for purposes of illustration only and in a non-limiting way the following is shown:

Figure 1 shows a sectional profile view of the evaporator device with an intermediate position of the movable cap.

Figure 2 is a perspective view of the piece which makes up the movable cap.

Figure 3 shows a front elevation of the elements which are part of the invention with the product container vessel coupled and with the cap in its maximum position.

Figure 4 is a similar view to the previous one seen from a side.

Figure 5 is a perspective view of the elements which are part of the invention without the container and the wick with the cap in its minimum position.

### PREFERRED EMBODIMENT OF THE INVENTION

[0018] Figure 1 shows the elements which together make up the evaporator device, which is based on case (1) which forms a plug (3) for connection to the electrical mains. Within case (1) is housed and anchored heater (5), with PTC type resistors acting as heat generating elements upon connection to the electrical power supply through plug (3).

[0019] The lower end of case (1) has an opening for coupling of vessel (2), which contains the volatile product, which rises through wick (4), which in turn passes through an orifice made for this purpose in heater (5) in order to expose the volatile product to the heat generated there.

[0020] The vapor produced in this way rises and flows to the outside through orifice (8).

[0021] The invention is centered on the inclusion of the regulating element (6) which consists of the movable cap (9) which is placed between wick (4) housed inside it and heater (5) as seen in this figure 1, so that it can move axially between the two elements.

[0022] The axial displacement is transmitted to the movable cap (9) by arm (12), which is connected to its upper part and which connects it to guide (13) which has its upper and lower extremes inclined and parallel.

[0023] In addition, on the front side wall of case (1) is provided an inclined track (10), closed internally by internal wall (17) which forms a window in case (1), as well as forming lower ramp (7) and upper ramp (14). This inclined track (10) houses guide (13) and is shaped to adapt to it, with the inclination of its edges matching that of ramps (7) and (14) on which they will slide, guide (13) being the component on which the user acts in order to regulate the rate of evaporation.

[0024] The motion of guide (13) is limited by the internal size of inclined track (10), so that the regulation element (6) is correctly placed at all times, which correct positioning is also aided by the position of movable cap (9) within the cylindrical orifice of the heater (5).

[0025] In this way the lateral displacement of guide (13) in either direction and due to its inclination and that of the inclined track (10) has the effect of raising or lowering the regulator element (6) and therefore causing the axial displacement of movable cap (9).

[0026] The presence of this movable cap (9) causes a chimney effect in the vapor which is generated, since it creates an upwards channel for the vapor which stops it from spreading to the sides and creating a riding vapor current. As this vapor does not spread to the sides and is channeled it empties the inside of case (1) through

orifice (8) more quickly, generating an upwards suction of the air in movable cap (9) which accelerates evaporation.

[0027] The different vertical positions for movable cap (9) allow it to create a chimney effect in the entire path of the vapor until it leaves orifice (8) thus establishing a maximum evaporation rate, or to partially complete this path, allowing the vapor to diffuse partially in nearby areas to a greater or lesser degree, thus managing to regulate the rate of evaporation.

[0028] In this preferred embodiment the position of guide (13) which defines the degree of evaporation is the one shown in figures 3 and 4, when it is in the extreme right hand position within inclined track (10), making the movable cap (9) complete the entire path of the vapor.

[0029] On the top the regulating element (6) forms battlements (11) which are used as stops for its vertical motion when they hit case (1), as seen in figures 3 and 4. In this maximum position annular wall (16) formed by case (1) is coupled inside battlements (11) to create an extension of the movable cap (9).

[0030] The position which results in a minimum rate of evaporation is the one shown in figure 5, with guide (13) in the leftmost position in inclined track (10), displacement in this direction also being limited by contact with arm (12) on heater (5). In this position as seen in this same figure, the vapor is allowed to spread to the sides, so that the chimney effect is minimal and therefore so is the evaporation, which in this point will be determined by the relative position between wick (4) and heater (5), as well as by their construction.

[0031] In addition, in the lowermost position of movable cap (9) it is interposed in the heat transmission between heater (5) and wick (4), thus reducing further the minimum rate of evaporation distancing it from the maximum value. In this way a greater regulation capacity is provided.

[0032] So that the user can identify several positions of guide (13), which is to say, rates of evaporation, the invention shall provide a graded scale (15) on the front side wall where inclined track (10) is located, which can consist of any type of marks which determine these positions.

[0033] In this preferred embodiment, regulating element (6) is made in plastic, although depending on the application of the evaporating device it can be made in any other material, since it may be interesting for the regulator element (6) to participate in heat transmission between heater (5) and wick (4).

[0034] Since the main characteristic of the invention consists of the use of this chimney effect to regulate the extent of evaporation, the invention foresees as an option, that the system with which the axial displacement of movable cap (9) is achieved can be any other which provides the same effect, whether by screwing or any other, with the intervention of different means.

## Claims

1. Evaporator for volatile products with evaporation rate controlled by means of an interposed moving cap, applicable to the evaporation of insecticides, perfumes or similar, consisting of a case (1) which forms plug (3) for electrical power supply, and having a replaceable container (2) for the volatile product, which rises through wick (4) to reach the area of influence of a heater (5), characterised in that regulation of the degree of evaporation is performed by a movable cap (9), which can be moved axially between wick (4) inside it and the orifice of heater (5), so that the presence of cap (9) defines a conduct for the vapour generated to rise, causing a chimney effect which favours evaporation as it accelerates the upwards flow of the vapour, regulation being obtained by the different positions of movable cap (9), so that the rising path of the vapour is completed to a lesser or greater degree until it leaves through orifice (8), while simultaneously a more efficient evaporation is obtained, and in that the interposition of movable cap (9) between wick (4) and heater (5) distances the extremes of evaporation, to allow a greater capacity of regulation.
2. Evaporator for volatile products with evaporation rate controlled by means of an interposed moving cap, as in claim 1, characterised in that movable cap (9) is connected to the upper end of arm (12) which in turn is connected in the other end to guide (13), which has inclined upper and lower edges, all of these elements defining the regulating element (6), and in that the front side wall of case (1) is formed inclined track (10) closed by inner wall (17) and making ramps (14) and (17), both inclined so that since guide (13) is meant to house inclined track (10) the displacement of its edges on ramps (14) and (17) causes it to rise or fall and therefore through arm (12) the positioning of movable cap (9) and the regulation of the rate of evaporation.
3. Evaporator for volatile products with evaporation rate controlled by means of an interposed moving cap, as in claim 1, characterised in that the axial displacement of cap (9), as an option, is performed by any technique or procedure or system deemed adequate and which has the same function of displacing movable cap (9) axially to create the chimney effect by which the evaporation is controlled.
4. Evaporator for volatile products with evaporation rate controlled by means of an interposed moving cap, as in claims 1 and 2, characterised in that in a visible place of case (1) a graded scale (15) is placed which identifies several positions for guide (13) and therefore several evaporation rates.
5. Evaporator for volatile products with evaporation rate controlled by means of an interposed moving cap, as in previous claims, characterised in that in the uppermost position of the regulating element (6) is determined by contact of battlements (11), which are provided in the upper area, with the inside of case (1), the former also being meant to house between them annular wall (16) formed by case (1), which in this position is an projection of movable cap (9), and in that the lowermost position of regulator element (6) is determined by contact between arm (12) and heater (5), both positions also being defined by the end positions of guide (13) within inclined track (10).
6. Evaporator for volatile products with evaporation rate controlled by means of an interposed moving cap, as in previous claims, characterised in that regulator element (6) is preferably made of plastic, although depending on the applications of the evaporator this component can be made of any other material.

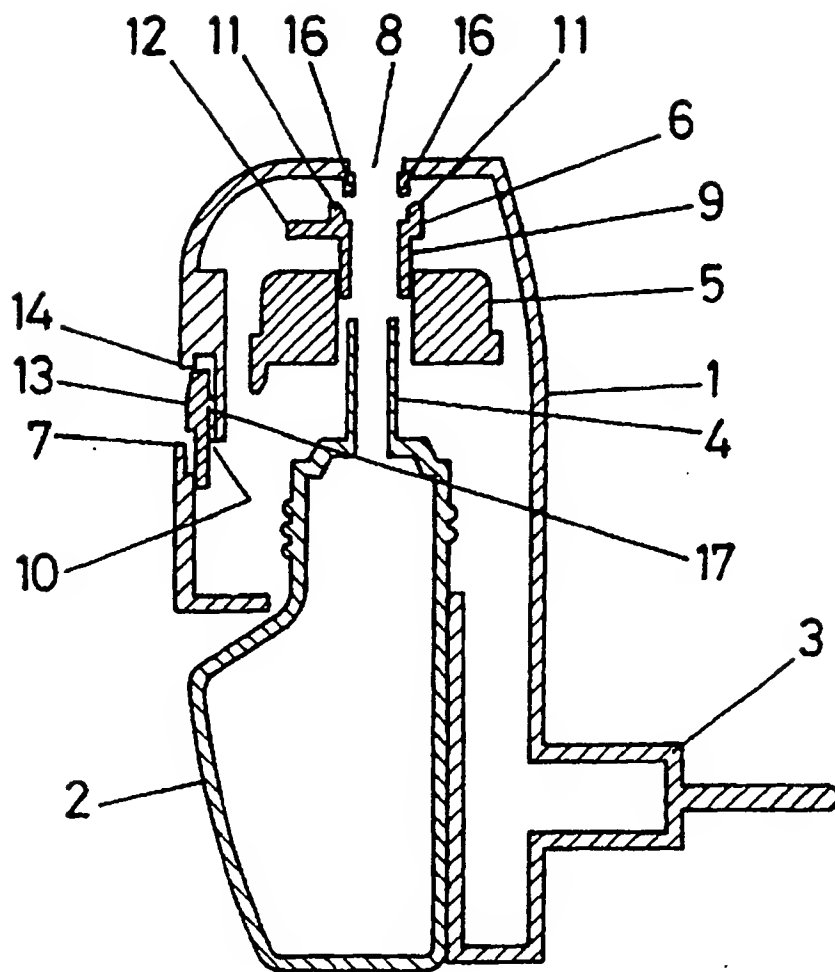
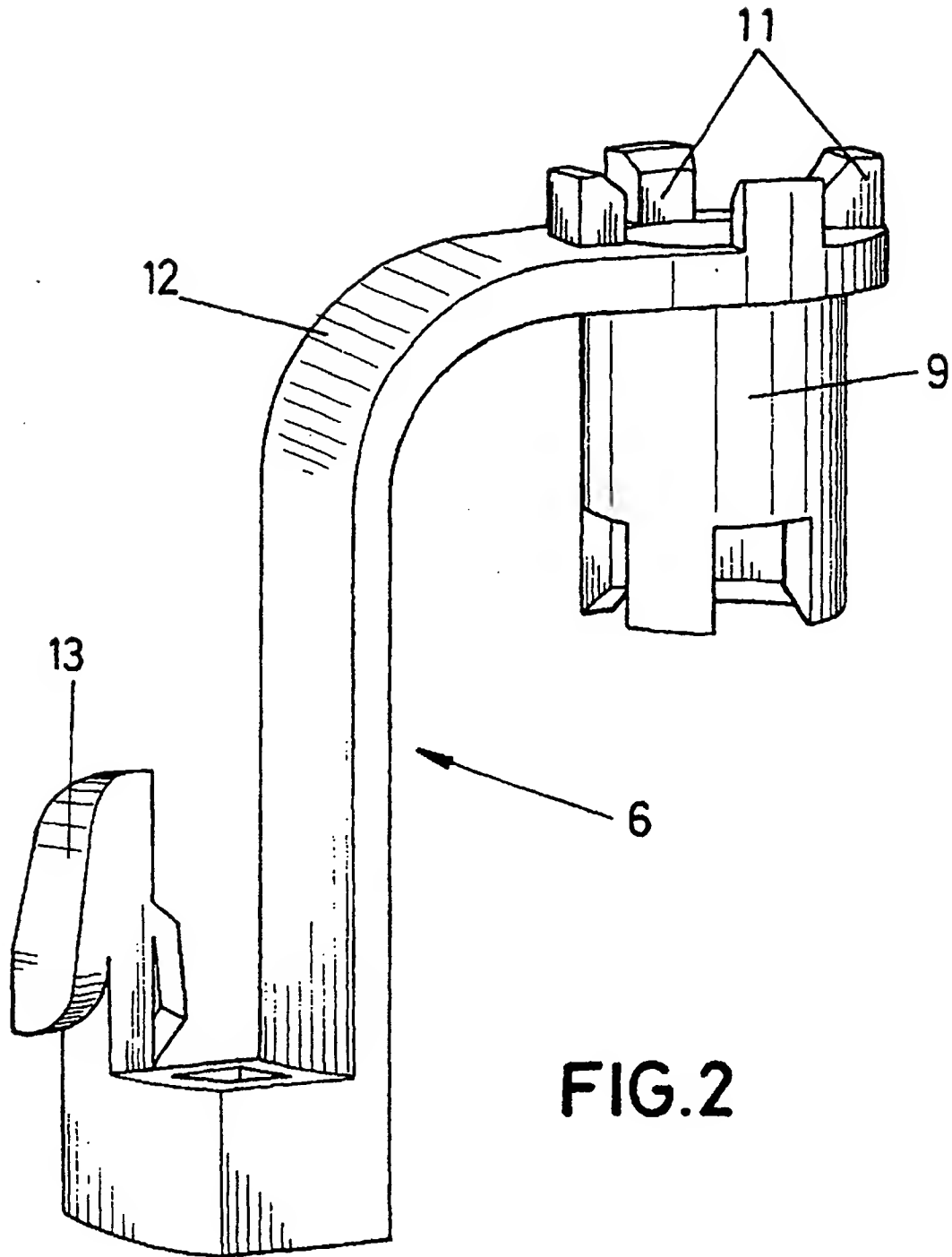


FIG.1



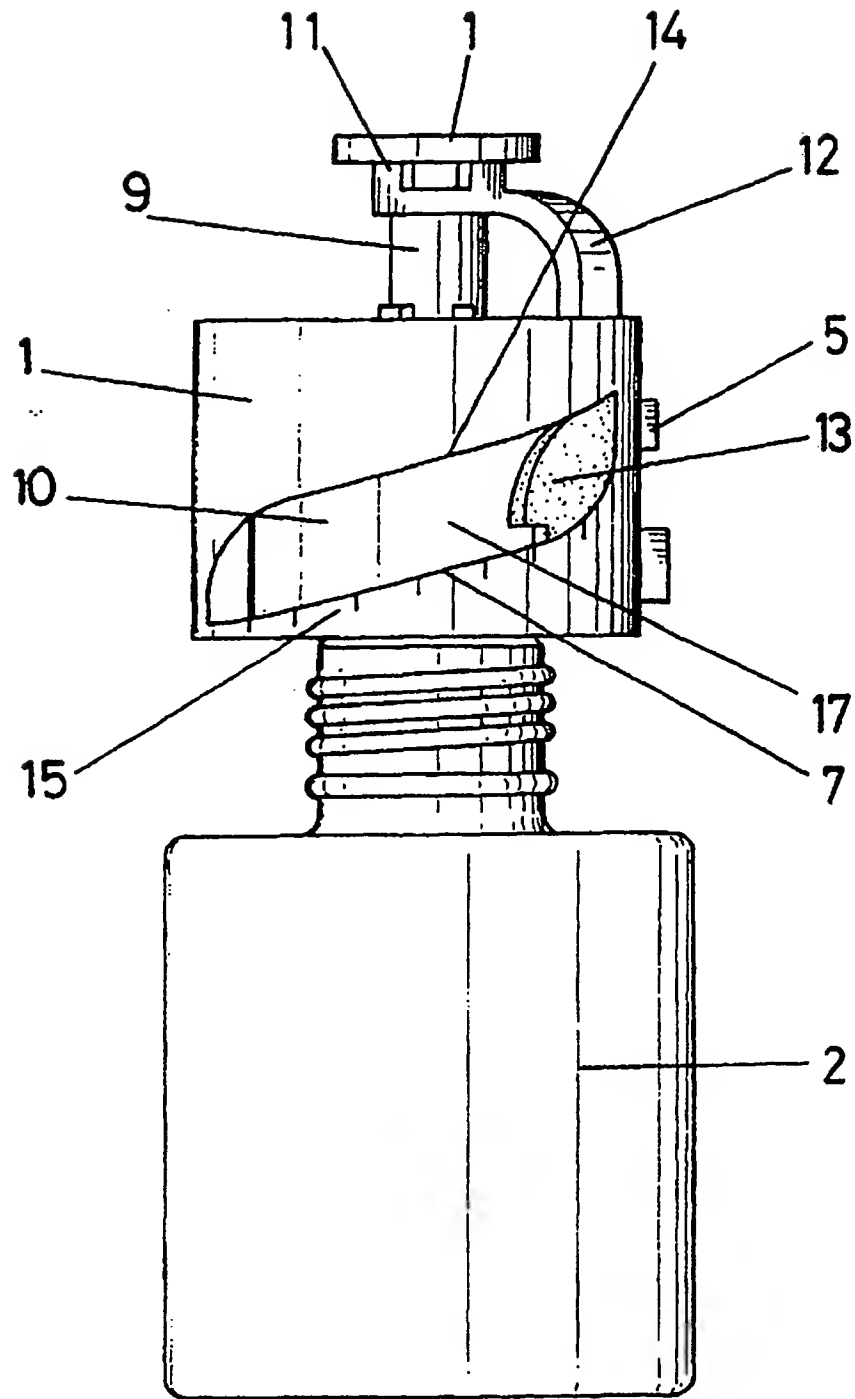


FIG.3

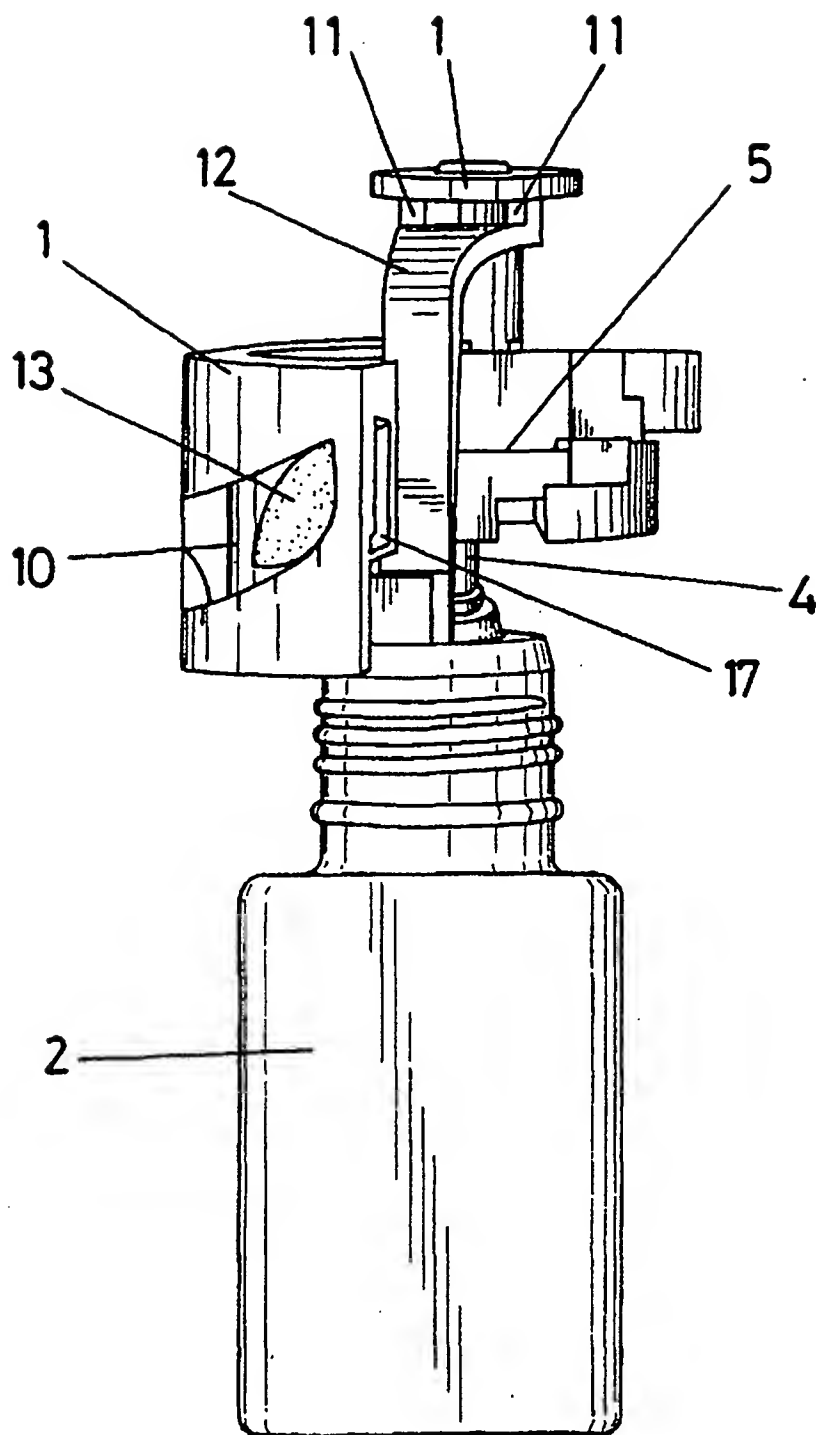


FIG.4

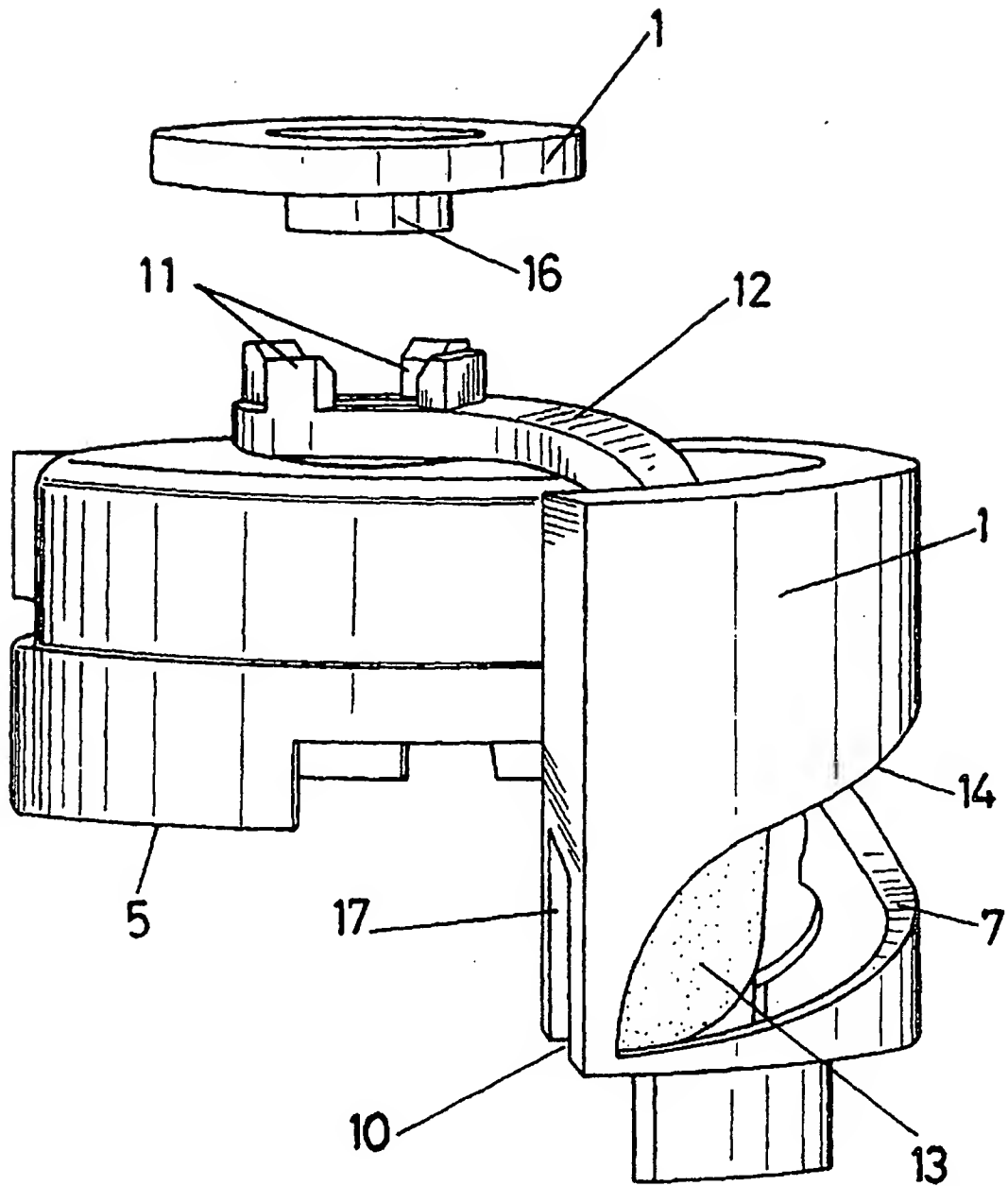


FIG.5

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES 99/00265

## A. CLASSIFICATION OF SUBJECT MATTER

CIP<sup>6</sup> A61L 9/03, A01M 1/20

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

CIP<sup>6</sup> A61L, A01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CIBEPAT, EPODOC, WPI, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ES 1015255 U (CRUZ VERDE-LEGRAIN) 16 June 1991 (16.06.91) Pages 6, 7; figures 1,2	1,5,6
A	WO 9819526 A1 (ZÖBELE) 14 Mai 1998 (14.05.98) Page 5, line 23 - page 8, line 9; figures 1,2,4	1,2,4-6
A	DE 29714848 U1 (BRUGGER et al.) 30 October 1997 (30.10.97)	
A	Data base Patent Abstract of japan in CD-ROM, MIJP 9712 PAJ, March 31, 1998 - 4 [039] [09-308301/09 - 331700] & JP 09308422 A (EARTH CHEM) 02 December 1997 (02.12.97)	

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" documents which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" documents referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" documents of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" documents of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search

29 October 1999 (29.10.99)

Date of mailing of the international search report

12 November 1999 (12.11.99)

Name and mailing address of the ISA/

S.P.T.O.

Authorized officer

Facsimile No.

Telephone No.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES 99/00265

**Box I** Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
- The third claim lacks technical features
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

**Box II** Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐  
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees

**INTERNATIONAL SEARCH REPORT**  
 Information on patent family members

 International Application No  
**PCT/ ES 99/00265**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
ES 1015255 U	16.06.1991	NONE	
WO 9819526 A1	14.05.1998	EP 0942648 A AU 6999898 A ITMI960733 U	22.09.1999 29.05.1998 07.05.1998
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